Winter Seminar and 46th AGM of the Geological Curators' Group

How can we make our precious collections available to researchers?

Sedgwick Museum of Earth Sciences and University of Cambridge Department of Earth Sciences

10-11th December 2019

Sedgwick Museum of Earth Sciences

UNIVERSITY OF CAMBRIDGE

GEOLOGICAL CURATORS GROUP GCG

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

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How can we make our precious collections available to researchers?

Day One

Department of Earth Sciences, Downing Street, CB2 3EQ

10.00 Arrival and registration with morning coffee

10.30 Welcome **Liz Hide**

10.40 **Mike Rumsey** *Tricky Types, not so Type-ical*

10.55 **Robin Hansen** *Analysis of a gem collection*

11.10 **Monica Price** *Dust off your polished stones*

11.25 **Roy Starkey** *Accessing Collections – Whose specimens are they anyway?*

11.40 **Mike Howe** *Research collections: A funder's view*

11.55 **Emma Bernard** *Unlocking hidden data in historic collections to address key scientific questions: A case study of the Chalk fish from Southern England*

12.10 **lunch** (Provided)

14.00 **Matthew Parkes** *Are Universities safe homes for geological collections? Two tales of contrasting fortunes*

14.15 **Robert Lowther** *University Geological Collections – The insight, challenges and surprises they hold*

14.30 **Emma Louise Nicholls** *"You're extremely accommodating, for a curator"*

14.45 **Discussion session** chaired by **Liz Hide**.

15.15 **Refreshments**

15.45 **Brighton Award**

16.00 **AGM**

17.00 **Posters and reception at the Sedgwick Museum**

Posters:

Lu Allington-Jones *There and back again – safeguarding research loans*

Sandra Chapman *Revitalising the NHM Fossil Bird Collection to attract more research*

Simon Harris *Opening up a closed hardware and software workflow to facilitate rapid digitisation of thin section collections*

Daniel Lockett *Fossils in Shropshire: The benefits and the issues surrounding the digitisation of a geology collection for access and research*

Matthew Porter *Giving large geological donations their DUE care and attention*

Day two

Sedgwick Museum's Collections Research Centre, Madingly Rise site and the British Antarctic Survey

Meet at the Collections Research Centre at the AG Brighton/ Forbes Building.

The U bus will take you there in about fifteen minutes from Trumpington Street. Alight the bus at JJ Thompson Avenue and the centre is about five minutes walk away. Time tables can be viewed: www.go-whippet.co.uk/wp-content/uploads/2018/09/U-timetable-both-directions-A4-size.pdf

10.00 **Arrival for workshops**

10.30 **Morning sessions**

12.30 **Lunch** (provided)

14.00 **Afternoon sessions**

16.00 **Close**

More information will be provided regarding day two on day one.

We would welcome engagement with our social media channels. Please Tweet, tagging in @OriginalGCG and @SedgwickMuseum. Hashtags to use are #2019GCG #tooprecious and #workingtogether

GCG are also on Facebook **GeologicalCurators' Group**

We are also looking for people to write blog posts. Speak to our Blog and Newsletter editor Emma Nicholls if you are interested in writing up this meeting for us.

Abstracts

Talks

Unlocking hidden data in historic collections to address key scientific questions: a case study of the Chalk fish from Southern England

Emma Bernard, Natural History Museum, London
Sinjiini Sinha, Edmonton, Canada
Wilfrid Pearson, University of Birmingham, Birmingham
Liam Gallagher, Network Stratigraphic, United Kingdom
Richard Twitchett, Natural History Museum, London

The environmental effects of global warming, such as higher seawater temperatures and reduced levels of dissolved oxygen in the world's oceans are predicted to cause a reduction in the sizes of marine fish. This hypothesis is mainly based on theoretical considerations and short-term experimental studies on small-bodied ectotherms, such as benthic marine invertebrates. The fossil record of past global change events provides an archive of data that can be used to test this hypothesis in taxa that cannot be studied in vivo, such as sharks and other apex marine predators, and over much longer timescales. One such event occurred around the Cenomanian/Turonian boundary and is recorded within the British Chalk.
The Natural History Museum, London, houses one of the most important collections of Late Cretaceous fish worldwide, containing substantial archives of potential data to test the size change hypothesis. Unfortunately, many of the NHM's Chalk specimens were collected more than 100 years ago and the often sparse stratigraphic data associated with them limits their usefulness. In order to improve this, a team comprising a curator, researcher, industry consultant and students, extracted nannofossils from the associated matrix of selected specimens in order to better constrain their relative ages and thus increase our dataset. As this involved altering the original specimen, the destructive and invasive sampling policy was applied. This involves individually assessing each specimen, producing a condition report, imaging the specimen before and after sampling, and recording the process on our collection management system for posterity; all of which is a time-consuming process. We worked with the research student to develop a workflow for this aspect of the study which eased the workload on the curator and gave the student a chance to develop curatorial skills.

Nannofossils biostratigraphy revealed that most museum specimens with original biozone information were correctly dated, although not all of them. Those specimens that had previously lacked stratigraphic control were successfully assigned to a specific biozone. In a few cases, we found significant discrepancies between the label data and nannofossil data, which could be due to a number of different reasons which will be explored.

During this study we discovered that Turonian lamniform shark teeth are surprisingly rare in UK museum collections. This does not seem to be the result of rock record bias as there are plenty of exposures of rocks of that age, but may indicate that the abundance of species did genuinely decrease during the Turonian. Following this discovery, we are now targeting the acquisition of Turonian Chalk specimens and plan to carry out collection-enhancing fieldwork to fill this 'gap' in the collection and to increase our dataset for future studies.

Analysis of a Gem Collection

Robin Hansen, Natural History Museum, London

Gemstones and worked objects have long been problematic for research. Visual identification of faceted or worked gem materials is difficult without crystal form or associated minerals. Specimens may have limited access due to mounting in jewellery, or strict security procedures due to high value. Restriction on destructive testing presents a further challenge, limiting the types of analysis. Many gem materials are routinely treated to change the colour and improve clarity, or may have synthetic counterparts. Information regarding treatments or synthetics is not always disclosed and they may be difficult to detect. These factors lead to specimens in Gem Collections being overlooked.
So how can gemstones be tested? Initial steps of microscopic observation combined with testing of optical properties using simple handheld gemmological equipment can give clues about crystal symmetry, elemental composition, treatments, synthetics and

even provenance. Laboratory equipment can provide further information using spectrographic data from x-rays, infrared, visible and ultraviolet light. Significant improvements in laboratory equipment over the last few decades allows analysis of gemstones on micro and nanoscale, removing only the tiniest portion of sample.
Historical collections can play an important role, providing gem material acquired before the invention of certain treatments. They may also provide important data on provenance or geological setting identification from chemical geofingerprints, particularly for locations that are no longer producing gemstones. Gem collections also hold a very wide variety of gem materials, both in terms of the range of mineral species and the varieties found within one species, allowing the creation of comparative data when standard data reference sets do not cover the wide spectrum of gem materials.

Research collections: a funder's view

Mike P. A. Howe, National Geological Repository, BGS/UKRI, Keyworth, Nottingham

It is generally accepted that research collections have three main uses: QA and repeatability; repurposing and re-use; and outreach and education. Whilst it is clearly important to educate the next generation of scientists, and the public at large, this can generally be achieved through the use of less scientifically important specimens.
UKRI now requires all grant holders to submit an acceptable data management plan. This will include details of planned sample collections, research procedures, and suggested final repositories. For repositories to be acceptable, they must be able to demonstrate likely longevity, professional and timely curation and conservation, and online access to a minimum level of specimen metadata. Full online access to images and associated data is a strong driver. Online access to specimen metadata is also fast becoming a mandatory requirement for research publications.


The NGR/BGS core and sample collection provides a pertinent case study. With 650km of core and several million samples from 22,500 UK and UKCS boreholes and wells, it is the national reference collection for the UK3D geological structure. Full specimen metadata is available online, together with high resolution images of all UKCS core.
Subsampling is allowed, subject to published regulations, and it is the responsibility of the NGR to track the resulting data, publications and any slides or other preparations. In line with NERC data policy, the resulting raw data is freely available through the BGS website after a two year confidentiality period. All preparations and residues must also be returned in due course. A series of barcoded tickets placed in the core where the sub-samples were taken provides a quick link to the data. Every time a researcher works on the collection, information is added to the body of scientific knowledge.
BGS has just invested £1.5m in four core scanners that enable the non-destructive measuring of a number of parameters, including gamma density, natural gamma, p-wave velocity, magnetic susceptibility, near infra-red spectra (for mineralogy), XRF element geochemistry and 2 and 3D x-radiography. All this data will eventually go online; some of the scans are already available. Looking to the future, as research becomes more collaborative and cross-discipline, aggregating databases linking to interoperable, downloadable data will become an essential component of research collections.

University Geological Collections – The insight, challenges and surprises they hold

Robert Lowther, Imperial College London

Any university department with an interest in geology will no doubt have a geological collection of some description, with physical samples to assist in undergraduate teaching as a minimum. In some establishments these collections have been transformed into museums and their existence is readily known to the scientific community. However, there are those collections kept within universities that are kept out of view from research due to various reasons. This talk explores the pressures and restraints that university collections face in the current academic climate while exposing some of the surprises these collections can throw up and benefits of the right samples being introduced to the right researchers.

“You’re extremely accommodating, for a curator”

Emma Nicholls, Horniman Museum and Gardens, London

When I received this in an email a few years ago, at first I thought they meant because I had roped in five other staff members to help me get the very heavy, metre long fossil skull off of permanent display (specific logistics of the exhibit made this particularly tricky) in order for their PhD student to study it, and they were just being grateful. But the ‘for a curator’ stuck in my mind. Once the student was buried in their research, I spoke to the supervisor about what they meant. I heard phrases such as ‘many curators don’t value scientific research’ and ‘curators often block access to collections’. It wasn’t the first or last time I have heard such notions.

Since the age of five I wanted nothing other than to work in a museum looking after palaeontological collections. You don’t necessarily need a PhD to become an expert in your field, but I was determined that that was the right path for me.

So perhaps it is because I am from an academic background, or perhaps there is another reason behind my attitude, but I am definitely of the belief “If not for research, education, and the overall good of science, then- for what, are we keeping these collections?”

Not every research request is black and white, there have to be shades of grey and that’s where the expertise of collections management staff comes in. Knowing what to and what not to do. However researchers also have a responsibility to respect that expertise, and to follow protocols specific to the collection they are visiting. The door between researchers and curators (often not mutually exclusive roles) should open both ways every time someone goes through it.

Are Universities safe homes for geological collections? Two tales of contrasting fortunes.

Matthew Parkes, National Museum of Ireland – Natural History, Dublin, Ireland

Whilst some University Geological Museums may be considered as very secure homes in which to deposit research collections, many University Geological Departments do not have any dedicated staff, public exhibition areas or even secure storage capacity for important research collections. For research students and staff, there may be a sense of permanence about both the University and the individual Geology Department, but experience has shown this is often not the case. Individual circumstances, university priorities and the whim of Departmental leadership may all result in negative outcomes for geological collections. This topic is explored through two examples in the Republic of Ireland.

The Geology Department of University College Dublin was required to put its substantial teaching and research collections into temporary storage in shipping containers for the duration of major building renovations to the block in which Geology was housed along with Zoology. Fast-forward some years and those ‘temporary’ solutions were still the home of the collections. In addition expanding student numbers meant there was enormous pressure on the space available within the Department, plus a changing landscape in which specimen based teaching was much less important. A solution to some of the situation was the agreed transfer of most of the palaeontological, palaeobotanical, mineral and some petrological teaching collections to the National Museum of Ireland.

By contrast another University Department which has a named geological museum within the heart of the University’s buildings, housed multiple bulk collections from PhD students (including the author’s). These were organised and catalogued and although in far from perfect conditions they were satisfactory. Material included some type, figured and cited specimens from published papers. These collections are no longer to be found and are presumed to have been disposed of as some of the labelled containers they were housed in have been found scattered around the Department with other unrelated items in them. No extant staff admit knowledge of the disposal and retired staff have so far thrown no light on a dark episode.

It is for such scenarios that GCG has produced an advice note for students and their supervisors to get plans in place early in a research project for secure homes for both specimens and data that may be collected.

Dust off your polished stones…

Monica T. Price, Honorary Associate (Mineralogy and Petrology), Oxford University Museum of Natural History, Oxford

I’m here to make the case for polished decorative stones in museums. They may be mere rocks, but each stone can carry a hefty load of cultural history associated with it, and for that reason alone, they offer huge potential for supporting research in the arts.

Nearly every museum geological collection has blocks of polished stone tucked away in it, whether relating to local industries, cultural travels of past centuries, or attractively informative samples acquired by modern geological collectors. Often side-lined in local museums if they don't have local origins, polished stones can nevertheless be used to enrich public appreciation of the local built environment, and can support academic and artistic research in sometimes surprising ways.

In my book Decorative stones: the complete sourcebook published by Thames & Hudson in 2007, I brought together images and information about the most commonly encountered decorative stones, ancient and modern. Five years later we launched the Corsi collection website (www.oum.ox.ac.uk/corsi) in which all 1,000 samples in this early nineteenth century collection are fully illustrated and documented. Another nearly 1,000 decorative stones are coming online as the Oxford University Museum of Natural Museum rolls out 'Collections Online' on its website, and images will be added in due course. I will be talking about my experiences of how very diverse kinds of researchers have been making very good use of the Museum's polished stone collections since we have advertised their availability online and through my publications. As geological curators, we can help researchers with little or no background knowledge of geology, interpret and reach sensible conclusions about geological materials used in arts contexts, and often at a very basic and rewarding level.

Of course, it helps if polished stone collections have good quality associated data, not always easy to extract from the trade, but often readily available by combining visual imagery with geological descriptions and topping it up with information we have gleaned from each other and from the wealth of good data rolling around on the internet. The more polished stone collections we can get online, the more we can help each other as well as attracting fresh research interest to our collections; and as we all know, getting our collections used well ticks lots of boxes.

Tricky Types, not so Type-ical?

Type specimens in mineralogy and the importance of getting types right for research

Mike S. Rumsey, Natural History Museum, London, International Mineral Association, Commission of Museums (IMA-CM)

As a concept, type specimens were not formally introduced as a discussion in the science of mineralogy until as recently as 1964, just after the formation of the IMA (International Mineralogical Association). But some authors had been using type like concepts long before this time, so thankfully important early research specimens were retained in museums. Currently we recognise three types of type but a fourth one is coming and the whole nomenclature is probably due for some discussion. Recent work at the NHM has highlighted the sacrosanct importance of types for getting modern research right and how surprisingly often our types are wrong! We will review the type concept in mineralogy, the important role that museums have ensuring their preservation and will consider a few recent case-studies from the NHM that highlight atypical types and how were working to solve the problems they pose.

Accessing Collections – whose specimens are they anyway?

Roy Starkey, Lapworth Museum of Geology, Birmingham

British museums are custodians of hundreds of thousands of mineral specimens, many collected more than 100 years ago, some purchased, others bequeathed or gifted for the public good. Curatorial standards vary widely across the sector and the current dire state of funding for museums (particularly provincial ones) means that mineral collections (and natural history

collections in general) are under threat as never before.

In years gone by local museums commonly had a knowledgeable curator with some subject specialisation skills appropriate to the particular nature of the collections e.g. archaeology, local history, geology, natural science etc. Nowadays, sadly this is unlikely to be the case. Even the expectation that there will be a curator (of any sort) cannot now be taken for granted.

During the past five years I have been engaged in the research for a book published in September 2018 – Minerals of the English Midlands. This involved visiting most of the local museums within the study area that hold geological collections with a mineralogical component, together with a number of university collections and the three national museums in Cardiff, Edinburgh and London. This experience, together with other research visits made on projects over the past ten years or so will be reviewed.

The needs of the researcher will be discussed and suggestions made as to how the work of the serious and knowledgeable amateur can assist, not only with collection development and curation, but also add value and expertise in a world where subject specialists are becoming the exception rather than the rule.

Finally, the notion that museum collections should be viewed as belonging to the public rather than the institution will be explored.

Posters

There and back again – safeguarding research loans

Lu Allington-Jones, Natural History Museum, London

There are multiple aspects to consider when preparing geological research loans. Packing considerations include vibration, contamination, fluctuations in relative humidity, transportation of liquid-stored specimens and hazardous materials. Careful consideration and risk assessment is required to ensure that specimens are not damaged, or that hazards are mitigated if damage occurs.

Revitalising the NHM fossil bird collection to attract more research

Sandra Chapman, Natural History Museum, London

This internationally important Fossil Bird Collection spans the Late Jurassic to the Pleistocene and includes 867 species, over 650 type specimens and approximately 4,500 specimens from the UK. It stores over 13,500 specimens including Archaeopteryx, twelve unbroken eggs of the Elephant Bird, Aepyornis, from Madagascar plus an egg of the Storm Petrel and eggs of the Moa and Ostrich and a fossil feather collection. It has been upgraded in major areas of taxonomy e.g. the Eocene birds of the London Clay plus the Enantiornithines. A digitisation, e-cataloguing, 3D printing and micro-CT scanning programme has been developed to raise the profile and use of the collection for researchers by delivering electronic documentation on EMU 6, a comprehensive database on the NHM web site together with a Collections Level Description, by imaging the best specimens and remounting of the iconic birds. The target for 2019/20 is the electronic documentation of at least 1,000 bird specimens, focusing on type, Mesozoic and iconic specimens. The benefits are that the Bird Collection is more research-ready for loans (3D and virtual), laser and micro-CT scanning and Photogrammetry, and iconic specimens are more readily available for NHM Public Engagement.

Opening up a closed hardware and software workflow to facilitate rapid digitisation of thin section collections

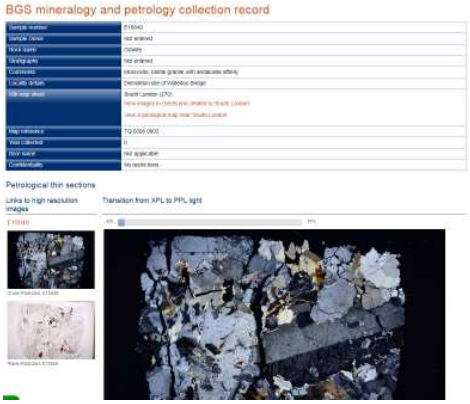
Simon Harris and Bob McIntosh, British Geological Survey, Keyworth, Nottingham

For a number of years, staff and volunteers at British Geological Survey offices in Nottingham and Edinburgh have been working hard to provide rich data (such as images and 3D scans) to accompany our sample metadata which is available through the BGS website.

One such project is the Britrocks Imaging Project, where volunteers use a digital SLR on a specially built rig to image our comprehensive collection of over 150,000 thin sections of English, Welsh and Scottish rocks. The imaging process is very rapid (only a few seconds per slide) and delivers a moderately high resolution of around 5µm/pixel.

Evidence suggests that the output images are widely used by students, researchers and others, and we have received multiple enquiries as to how the project might be replicated in other institutions. Whilst this is in theory easy to do, certain barriers to adoption exist, for example, the equipment and skills required to make the required hardware, and the presence of expensive proprietary software in the processing workflow.

This poster aims to explore some of the ways in which we hope to open up our workflow to allow it to be utilised in a much larger number of similar collections.



Fossils in Shropshire: the benefits and the issues surrounding the digitisation of a geology collection for access and research

Daniel Lockett and Jackie Tweddle, Ludlow Museum Resource Centre, Ludlow, Shropshire

There are multiple benefits to digitising a collection. These include improving ways to provide access to stored collections, the chance to re-discover material thought lost and for the museum the opportunity to engage experts in assessing and identifying important specimens. However, there are also practical issues and challenges that must be overcome in order to get that material digitised and out into the wider world. These can range from how to best digitise a large mammoth bone, to how the final images will be hosted and how will people access them.

The Fossils in Shropshire project has been working since 2016 to digitise, catalogue and make available on-line, the most important specimens now held by Shropshire Museums at its Collections Centre in Ludlow. A significant element of research has also helped the museum learn more about its collectors and collections and to share that publicly.

Giving large geological donations their DUE care and attention

Matthew Porter, Natural History Museum, London

A curatorial issue affecting the processing of large geological donations and their subsequent incorporation into existing collections is the current lack of practical methods to allow for digitisation upon entry (DUE) for large numbers of specimens. This invariably leads to a backlog of large-scale acquisitions of great scientific importance that are inaccessible to researchers.

We used a recent acquisition of 1200 Cenozoic fossil corals collected by Stanley Frost from multiple sites across Europe, the Middle East and South East Asia, as a pilot project. This was because the specimens were sent with a basic electronic inventory and archives including locality and stratigraphic information. It was sorted into geographic locality and digitised to our 'core' data standard, which includes taxonomic name, site, stratigraphic and acquisition data, which is all now available on our collections data portal. We decided that this would provide enough information for the collection to be managed by the museum and assessed for its scientific interest by the research community. This will be a future recommendation for all potential large scale acquisitions of a similar nature. Further to this we also made workflows based on lessons learned from the project, so as to inform future collection acquisitions regarding the level of preparation needed beforehand, the prioritization of resources and the time required.

By ensuring the specimens met our core data standards and following the workflows developed during the project we managed to rehouse 1200 specimens in under a year. We integrated them into the collections, each specimen labeled with their individual taxonomy, stratigraphy and locality. Digital records for each specimen were also added to our collection management system and are now available on our data portal for use by external researchers. The implications of this are that we now have a better understanding of how to assign and prioritize resources for future large-scale collection acquisitions, have clear workflows detailing practical methods on how to rehouse large numbers of specimens and can now have a framework to efficiently increase the accessibility of these types of collections to researchers.

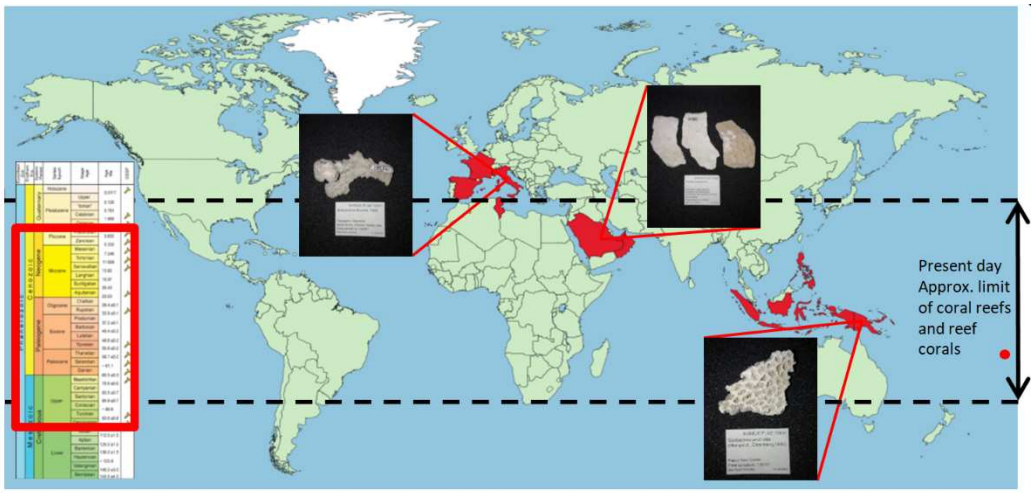


Fig 1: Stanley Frost's collection sites :- France, Spain, Italy, Tunisia, Saudi Arabia, United Arab Emirates, Oman, Indonesia, Philippines , Papua New Guinea, and French Polynesia. Stratigraphic chart indicates the age range of fossil coral specimens.

Acknowledgements

Many thanks to everyone who has helped with the organisation, without whom this winter seminar would not have taken place. Special thanks must go to a few people. Firstly, thanks must go to Liz Hide and her team at the Sedgwick for their on the ground organisation and hosting. Without institutions offering their facilities to the GCG, we would not be able to hold our events. Thanks must also go to all of the contributors of our meeting, without you we would not have any content to learn from or discuss. Thank you to the GCG Committee, for all your help and support with events over the year. Special thanks must go to Simon Harris, for all his website wizardry and general IT support and Rachel Walcott for responding to my endless emails.

Last but not least, thanks must go to Hilary Blagbrough and her colleagues at the British Antarctic Survey for hosting tours through their collections.

If you are interested in hosting a GCG event, or have ideas for additions to the programme, do send me an email at events@geocurator.org.

Zoë Hughes, GCG Programme Secretary